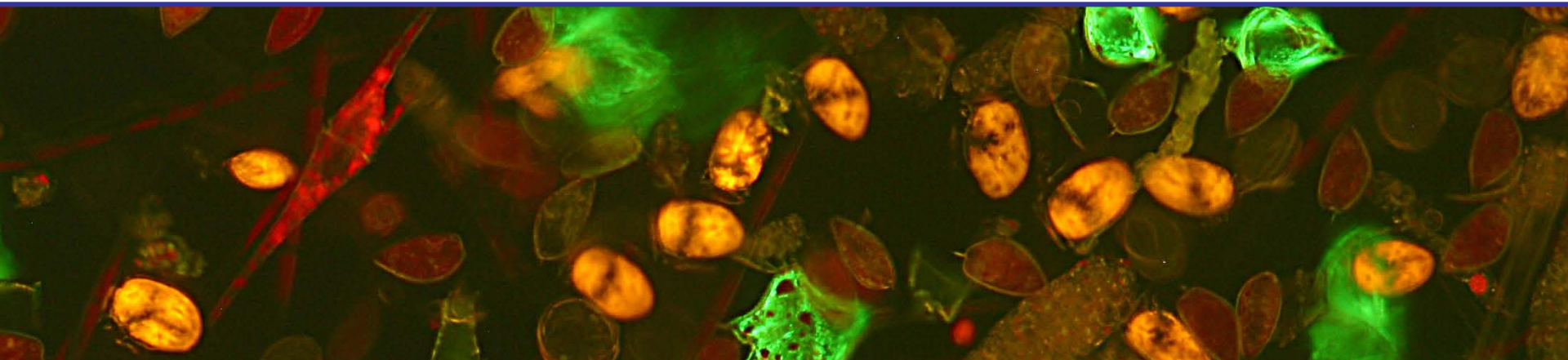
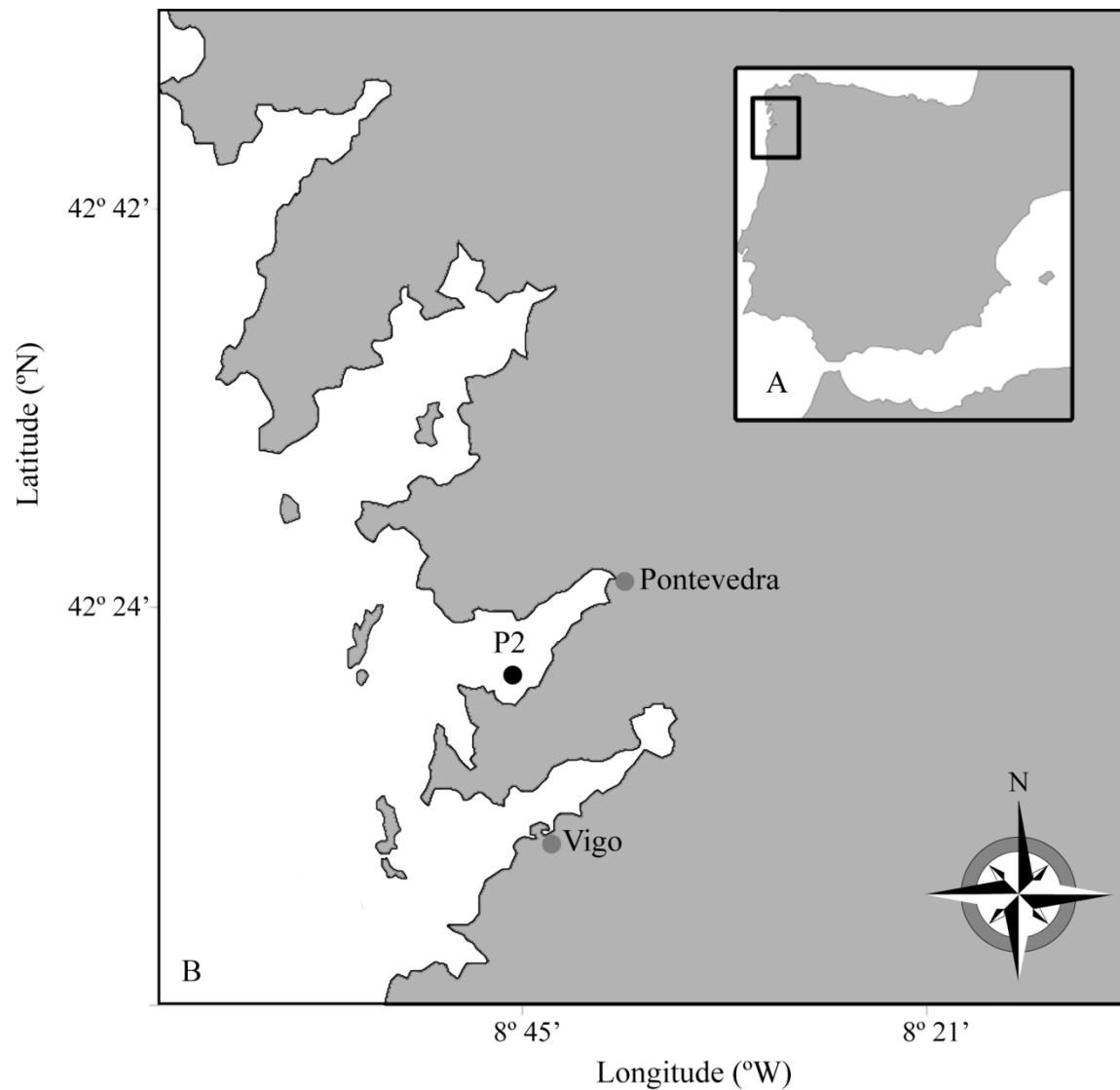




Avances en la predicción de floraciones de *Dinophysis* y acumulación de sus toxinas en los bivalvos

Beatriz Reguera
Instituto Español de Oceanografía (IEO), Vigo.





**Las Rías Baixas gallegas en el noroeste de la Península Ibérica (España + Portugal).
Zona de producción de 250 000 t anuales de mejillón y 10 000 t de otros bivalvos**



Ría de Vigo vista desde el Puente de Rande



IEO C.O.Vigo



**Applied Simulations and
Integrated Modelling for the
Understanding of Toxic and
Harmful Algae Blooms (EU
FP7)**

- Modelling of physical – biological interactions leading to the forecasting of toxic algae events
- Identification of key past events which will be re-analysed and used for training the modelling system
- Design of regional model systems and delivery of nowcast for specific HABs and location information, transport pathways, remote sensed data.

Numerical models with realistic mixing and thermocline structures will help us synthesize diverse data types from different instruments and experiments, and aid us to understand thin-layer dynamics.



Con la participación de:

IEO

- Fran Rodríguez
- Patricio Díaz (UACH)
- Lourdes Velo-Suárez
- Laura Escalera
- Gemita Pizarro (IFOP)

INTECMAR

- Ángeles Morono
- Yolanda Pazos

CBM (UAM)

- Irma Marín
- Nicolás Raho

IFREMER-Brest

- Marc Souriseau
- Lourdes Velo-Suárez

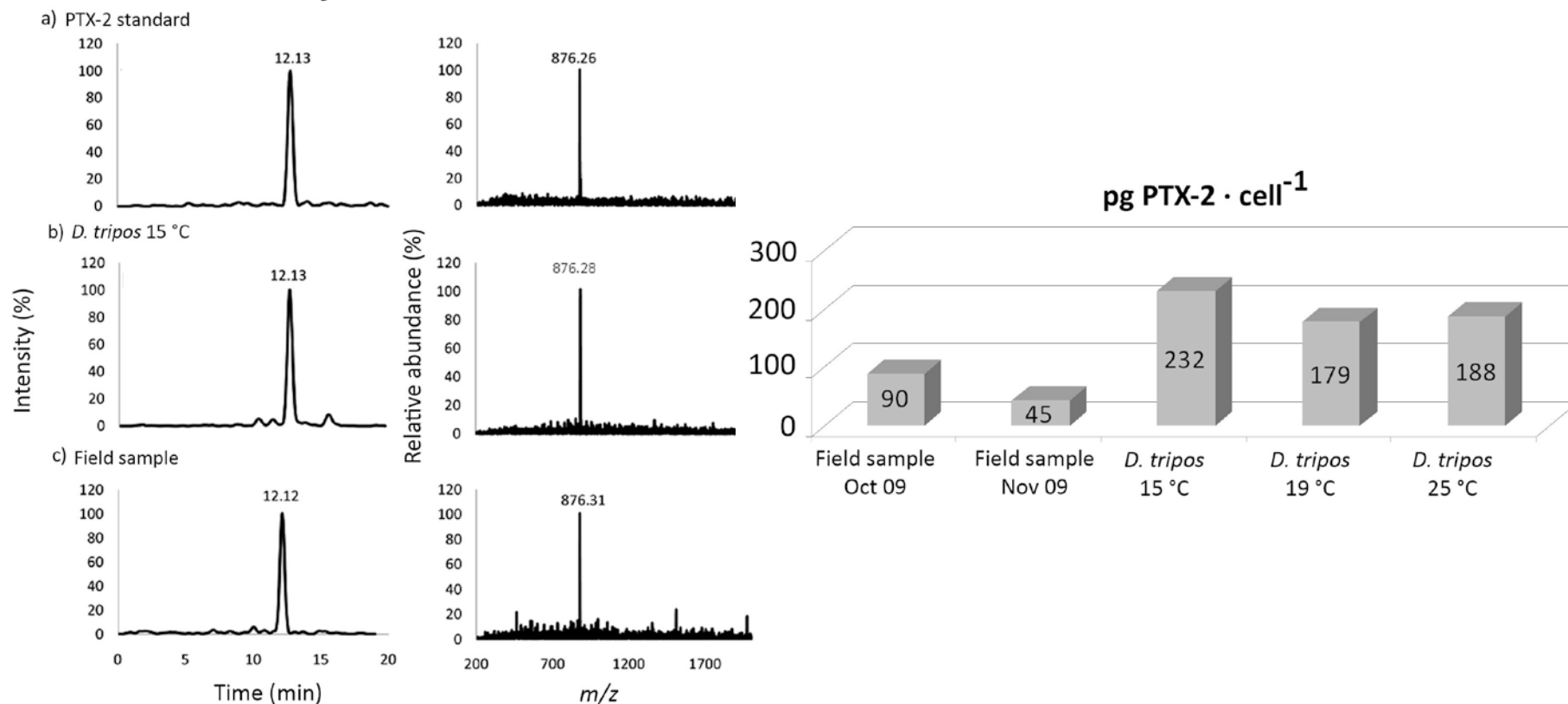


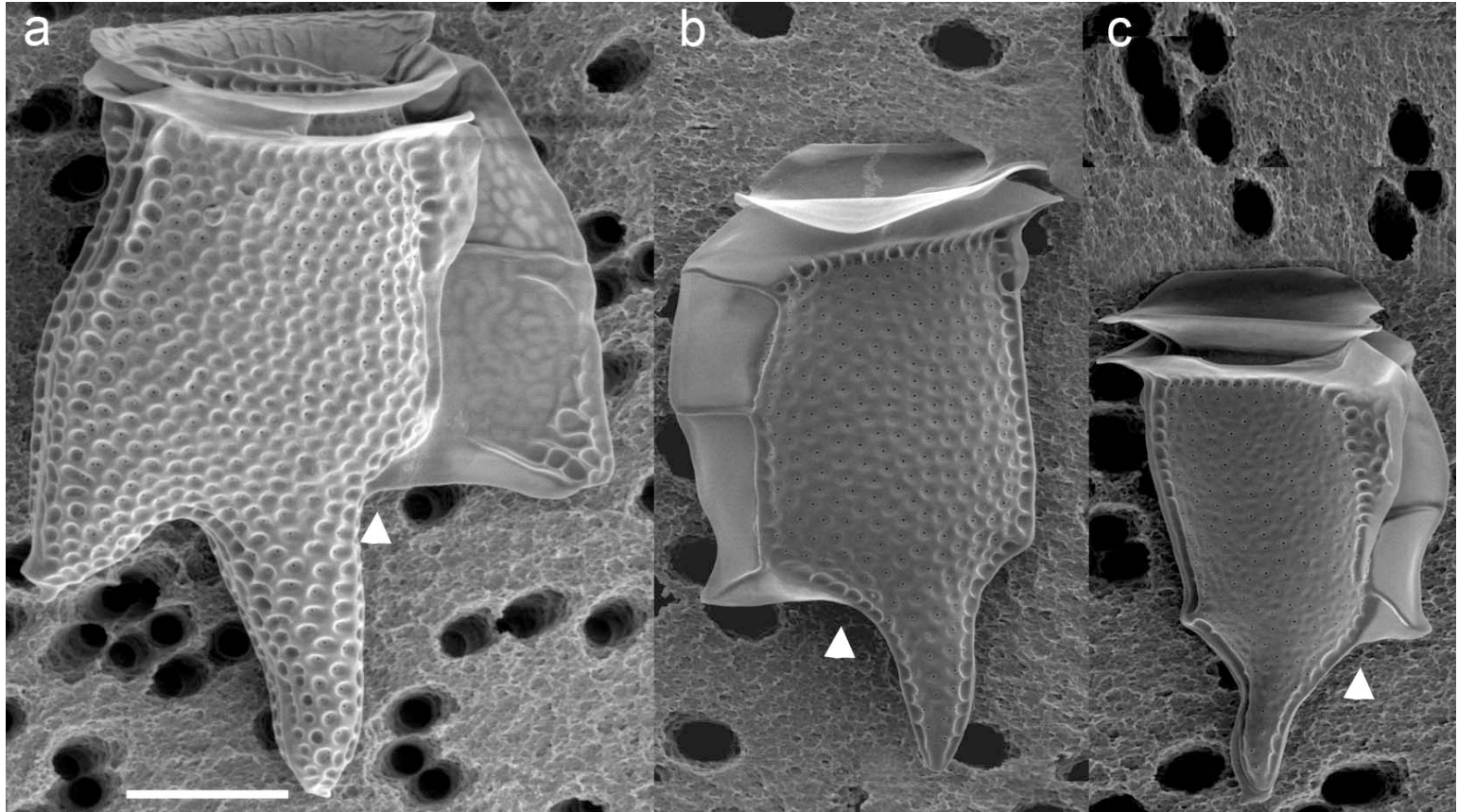
Contestando viejas preguntas
con la ayuda de los cultivos
recientemente establecidos de
cepas gallegas de *Dinophysis*



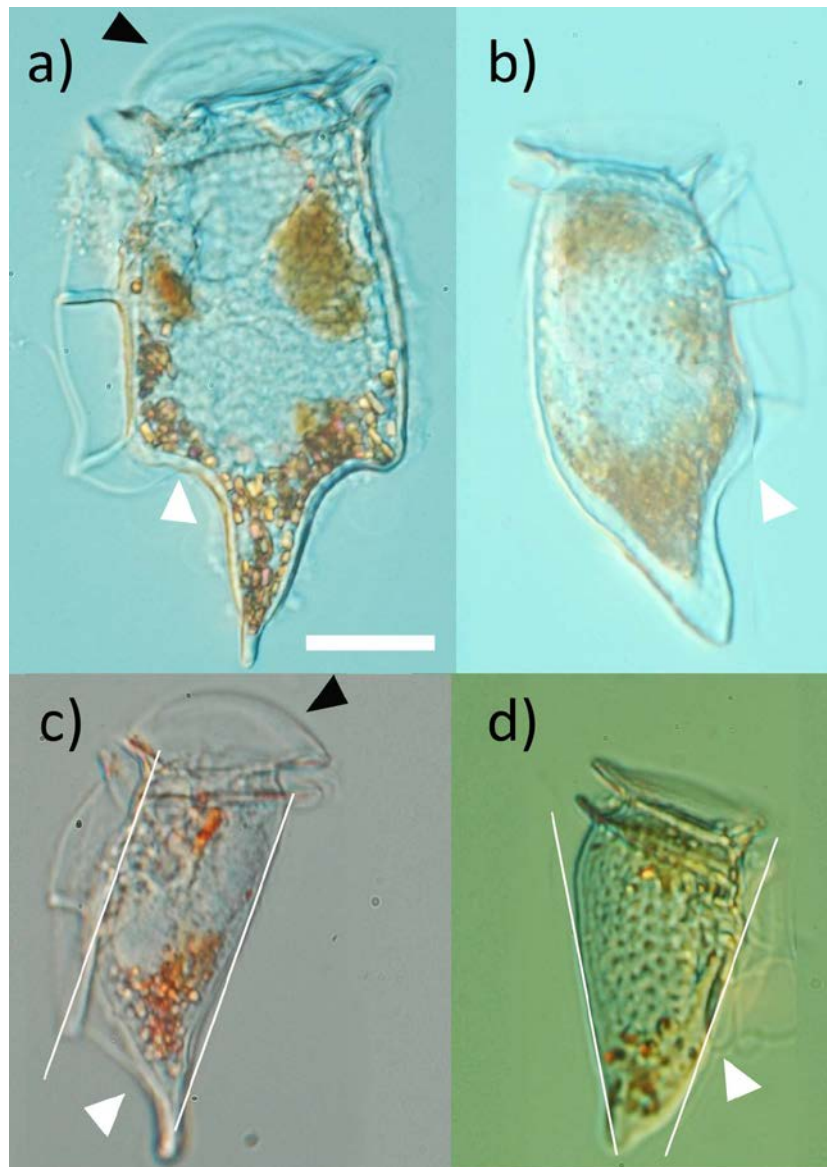
Morphological variability, toxinology and genetics of the dinoflagellate *Dinophysis tripos* (Dinophysiaceae, Dinophysiales)

Francisco Rodríguez^{a,1}, Laura Escalera^{a,1,*}, Beatriz Reguera^a, Pilar Rial^a, Pilar Riobó^b, Themis de Jesús da Silva^{a,2}

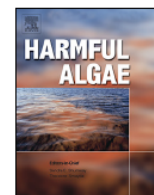




Células vegetativas normales, formas intermedas y células pequeñas de *Dinophysis tripos* en cultivo (Rodríguez et al., 2012).



Diferencias morfológicas entre las formas intermedias y pequeñas de *D. tripos* (izqda) y *D. caudata* (dcha) (Rodríguez et al. 2012)



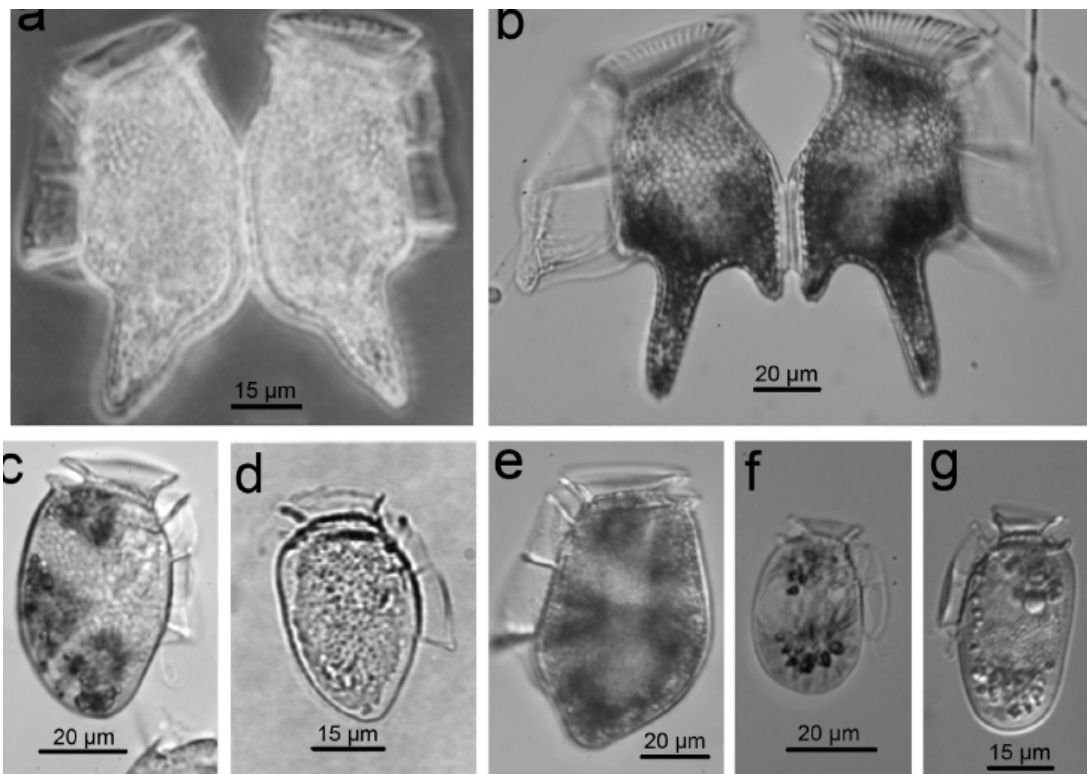
Are the mitochondrial *cox1* and *cob* genes suitable markers for species of *Dinophysis* Ehrenberg?

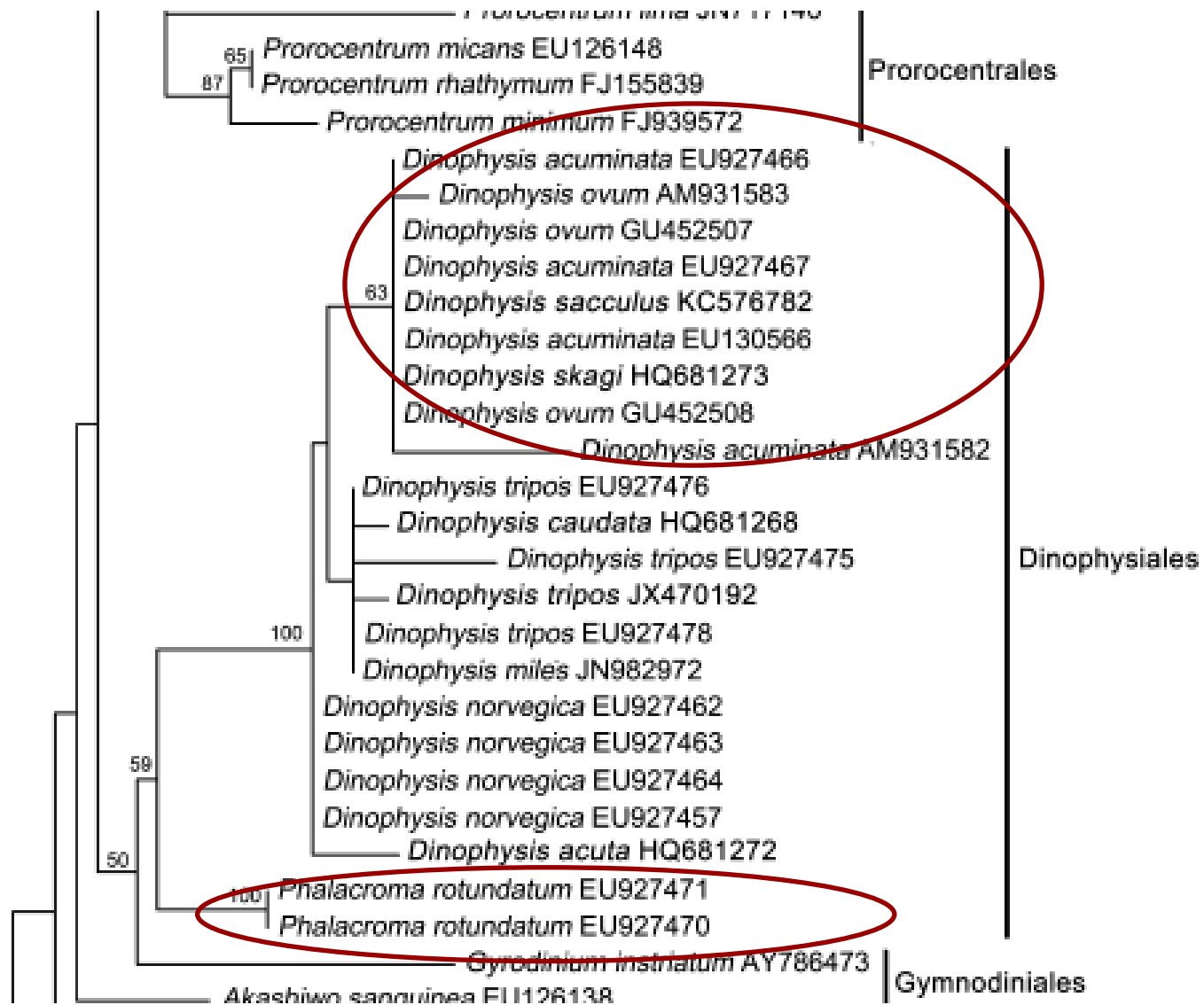


Nicolás Raho^a, Francisco Rodríguez^b, Beatriz Reguera^b, Irma Marín^{a,*}

^a Departamento de Biología Molecular, UAM, Cantoblanco, 28049 Madrid, Spain

^b IEO, Centro Oceanográfico de Vigo, Subida a Radiofaro 50, 36390 Vigo, Spain





Maximum likelihood phylogenetic tree of dinoflagellates inferred from the mitochondrial cox1.

Mar. Drugs **2013**, *11*, 1-x manuscripts; doi:10.3390/md110x000x

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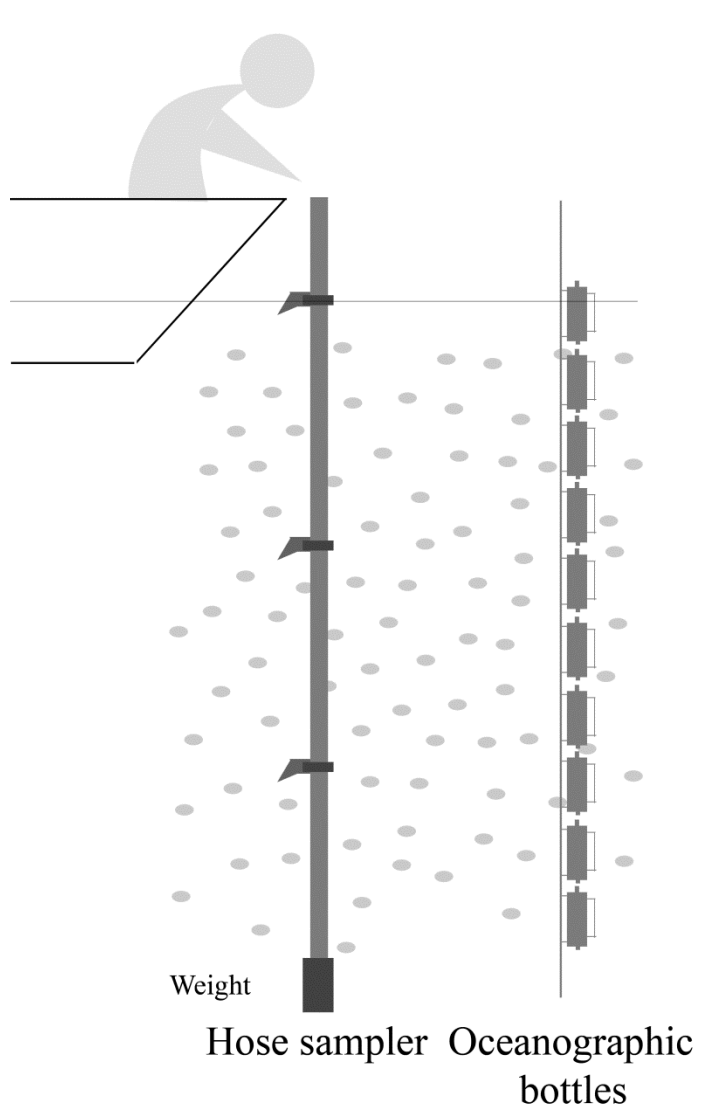
ISSN 1660-3397

www.mdpi.com/journal/marinedrugs

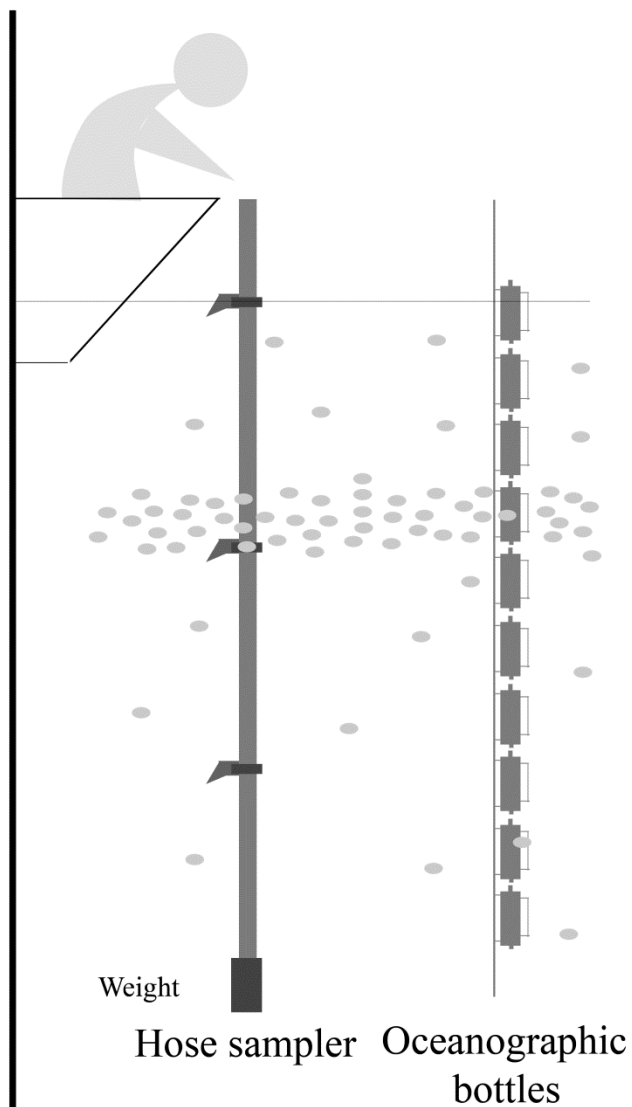
Article

Evaluation of Passive Samplers as a Monitoring Tool for Early Warning of *Dinophysis* Toxins in Shellfish

Gemita Pizarro ^{1,†}, Ángeles Morono², Beatriz Paz¹, José M. Franco³, Yolanda Pazos² and Beatriz Reguera^{1,*}



HOMOGENEOUS DISTRIBUTION



PATCHY DISTRIBUTION

Muestreadores pasivos

SPATT = Solid Phase Adsorbing Toxin Tracker
(MacKenzie et al. 2005)

Toxinas en fitoplancton

Bombeo agua 1-5 m prof.



Salabres con mallas de 100, 77 y 20 μm
Frecuencia muestreo: semanal 2005, 2006



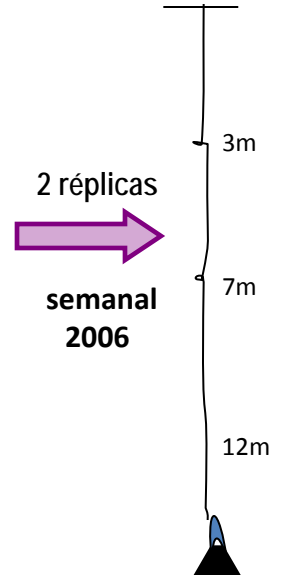
Red de plancton 20 μm (vertical 0-20 m prof.)

Toxina libre (extracelular) en el agua de mar



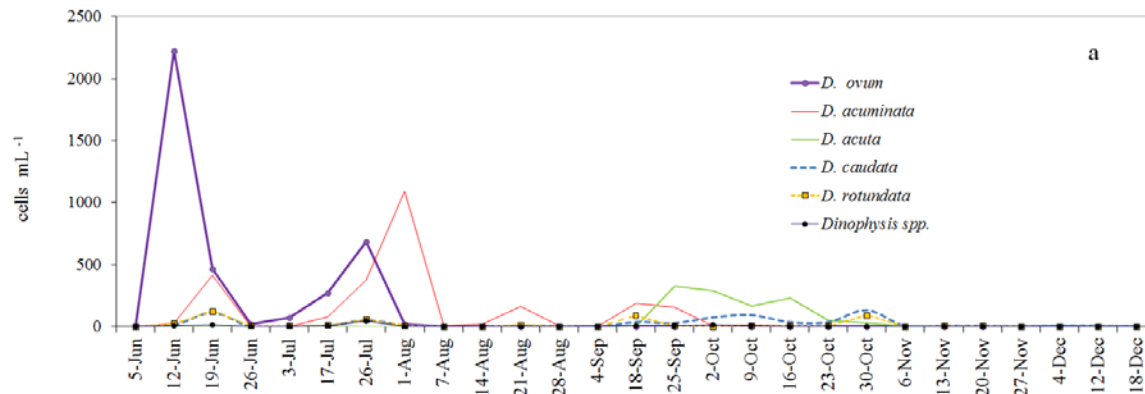
Discos (red 77 μm)

Resinas DIAION HP-20,
adsorbentes pasivos
de toxinas

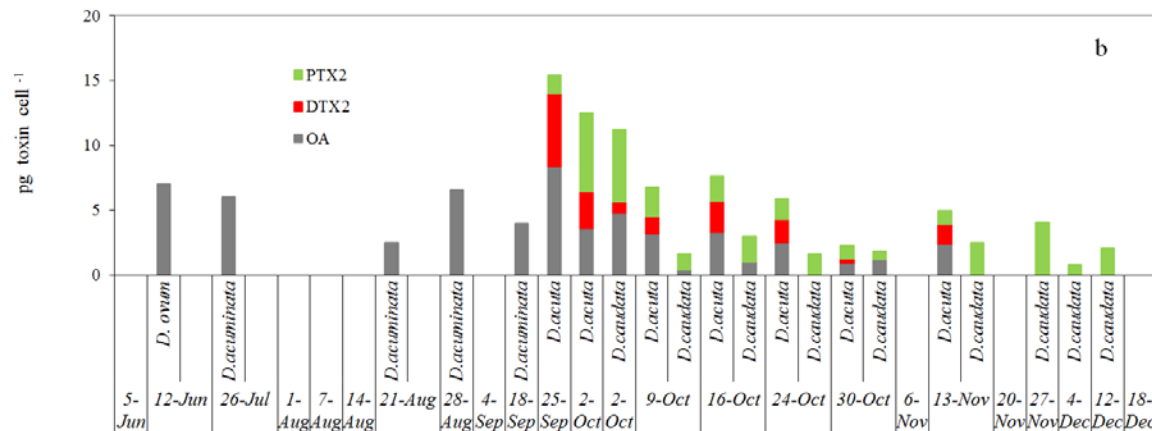


Suspendida desde una de las bateas, a prof. en las que se monitorean toxinas en mejillones.
Idea: Simular un mejillón

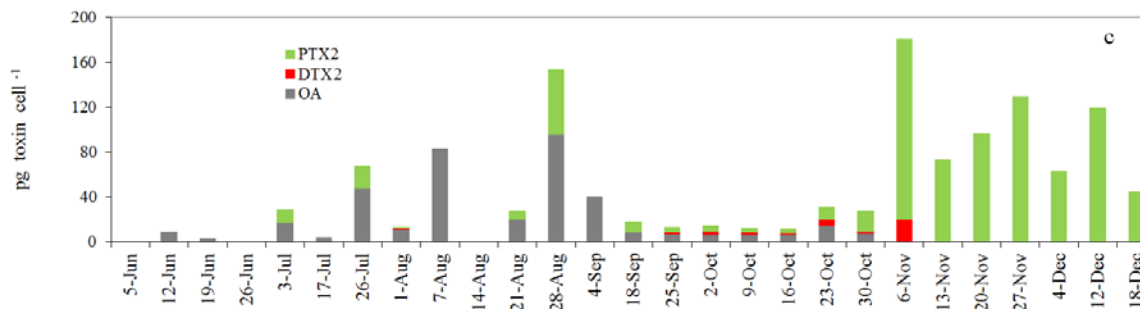
(Pizarro, Tesis 2008)



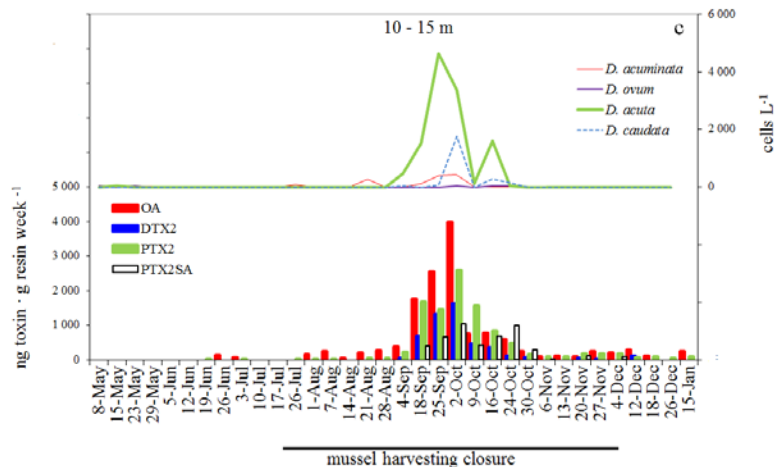
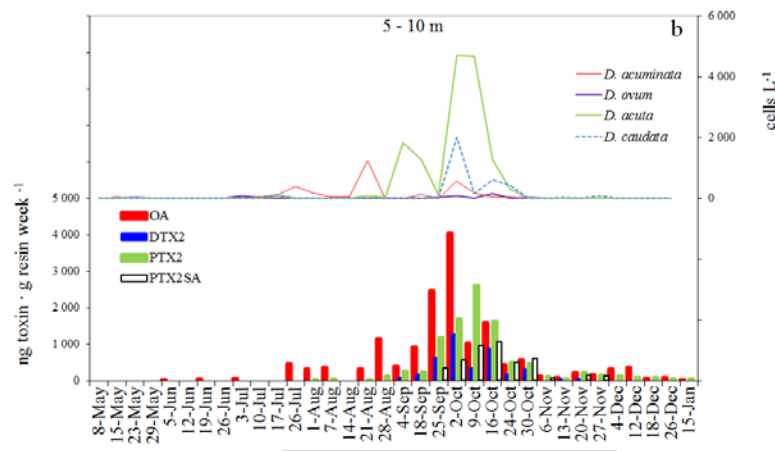
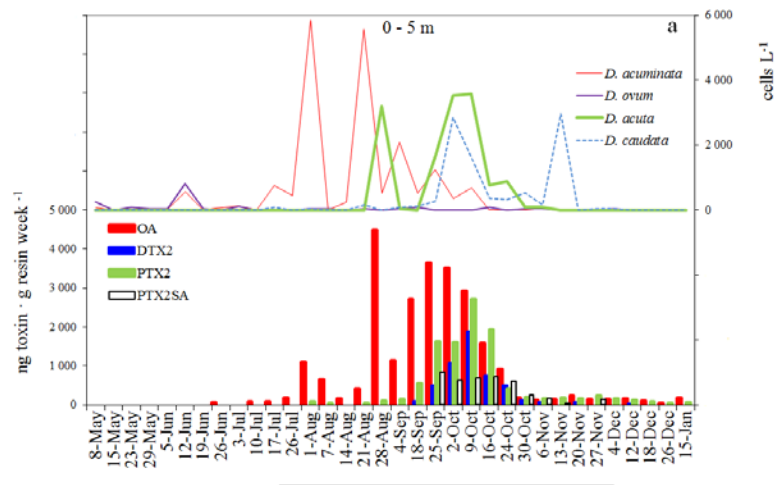
Dinophysis species



Toxin/cell (LC-MS) in picked cells

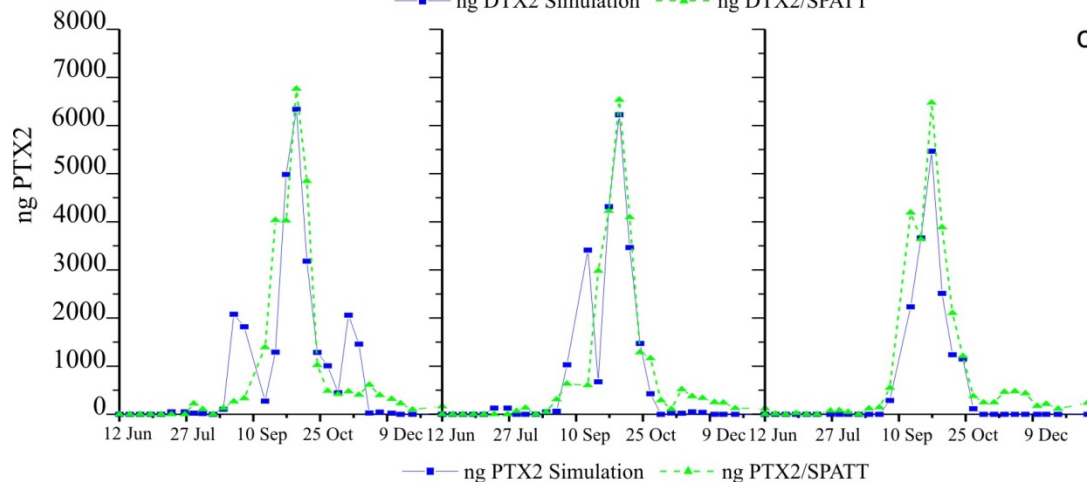
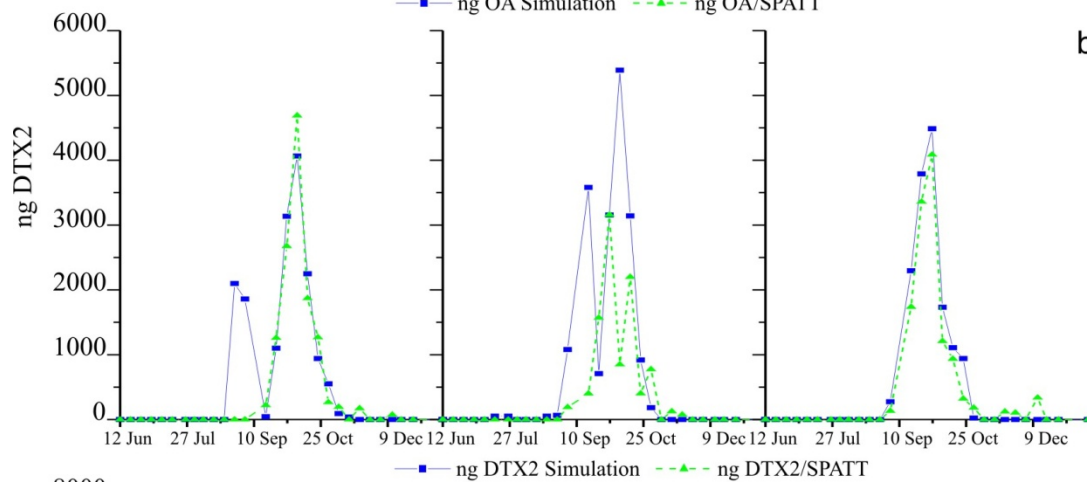
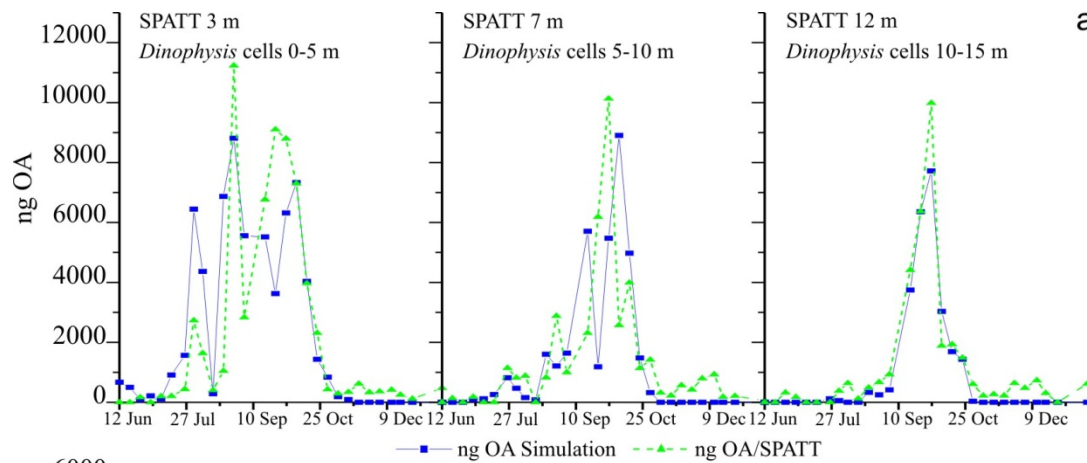


Toxin/cell (LC-MS) in plankton (20-77 µm) concentrates



Concentración de *Dinophysis* versus toxinas acumuladas en las resinas SPATT

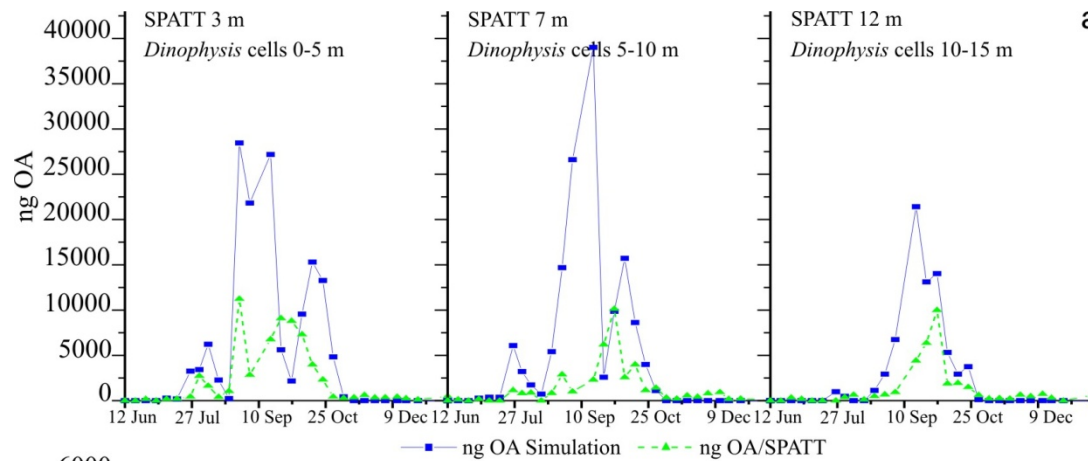
Toxinas detectadas en las resinas SPATT hasta 2 meses después de ausencia de *Dinophysis* en la columna de agua y levantamiento de la veda de recolección de mejillón.



Fitting of the simulations of toxin accumulation on the SPATT based on toxin content ($\text{pg} \cdot \text{cell}^{-1}$) per cell of *Dinophysis* estimated from analyses of picked cells of each species, to actual data of accumulation of

(a) OA
(b) DTX2
(c) PTX2.

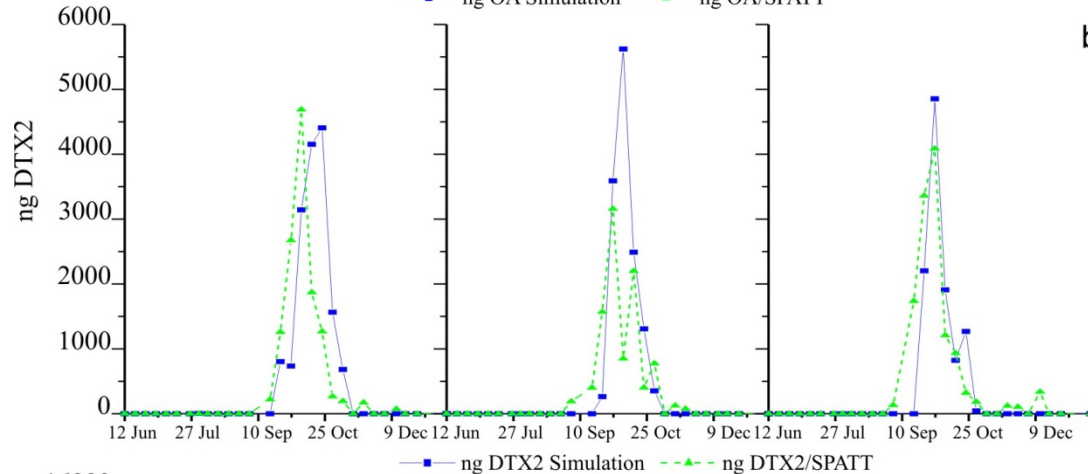
$$\frac{dT_a}{dt} = C_{\text{cell}} \cdot C_{\text{tox}} \cdot F_{\text{ads}}$$



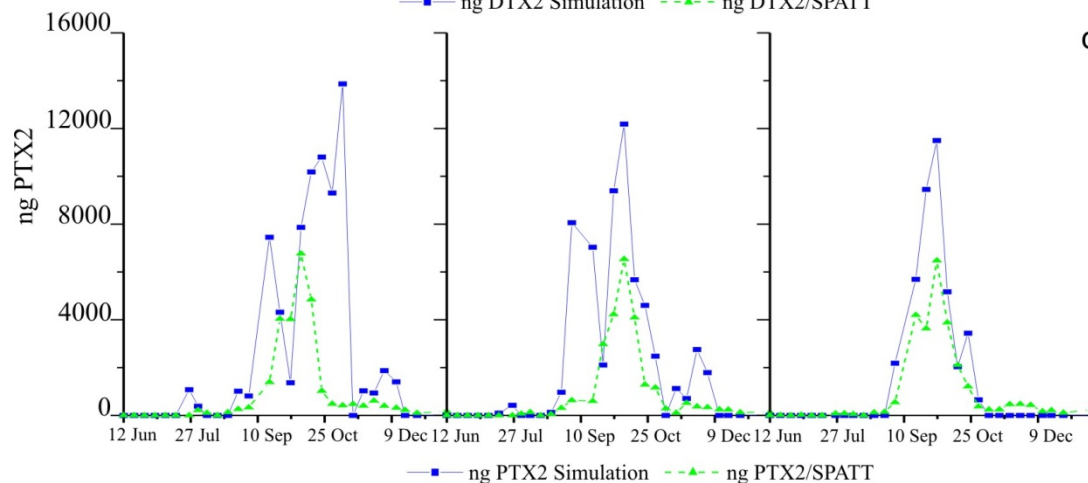
a

Fitting of the simulations of toxin accumulation on the SPATT, based on toxin content ($\text{pg} \cdot \text{cell}^{-1}$) per cell of *Dinophysis* estimated from analyses of the size-fractionated ($77\text{-}20 \mu\text{m}$) plankton concentrates, to the actual data of accumulation in the SPATT

(a) OA
(b) DTX2
(c) PTX2.



b



c

$$\frac{dT_a}{dt} = C_{\text{cell}} \cdot C_{\text{tox}} \cdot F_{\text{ads}} \cdot V$$



Deep Sea Research Part II: Topical Studies in Oceanography

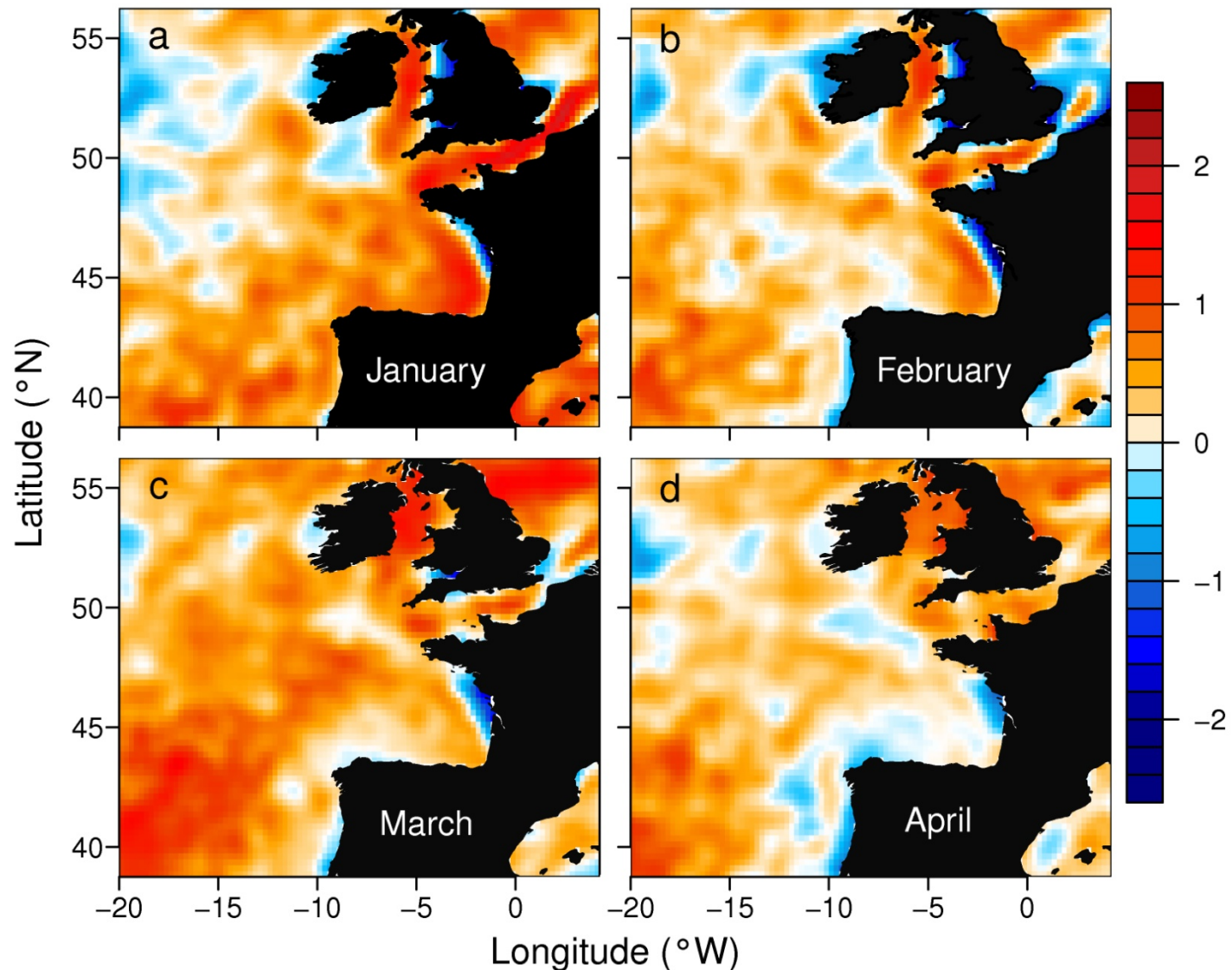
Available online 15 March 2013

In Press, Corrected Proof — Note to users

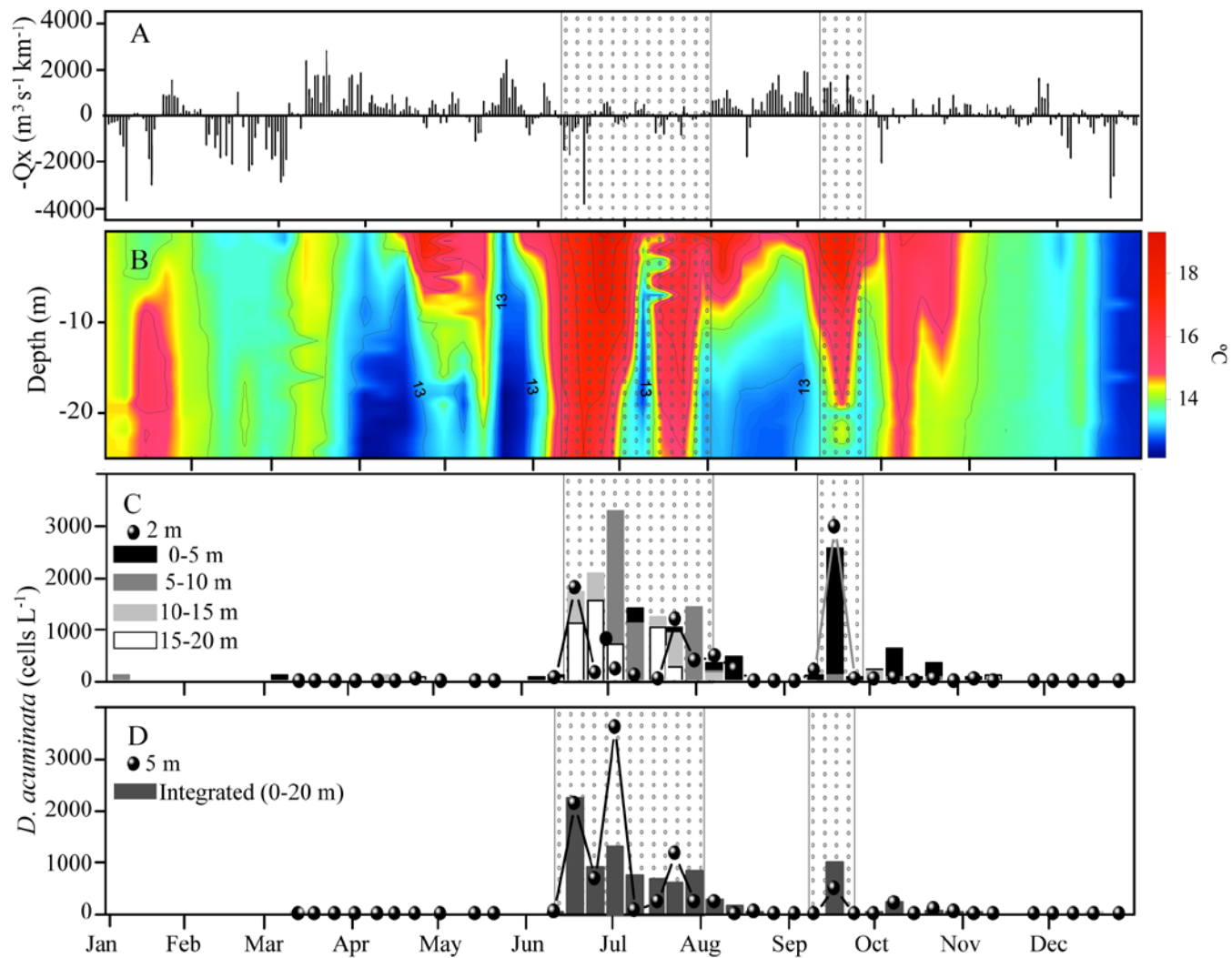


The growth season of *Dinophysis acuminata* in an upwelling system embayment: A conceptual model based on in situ measurements

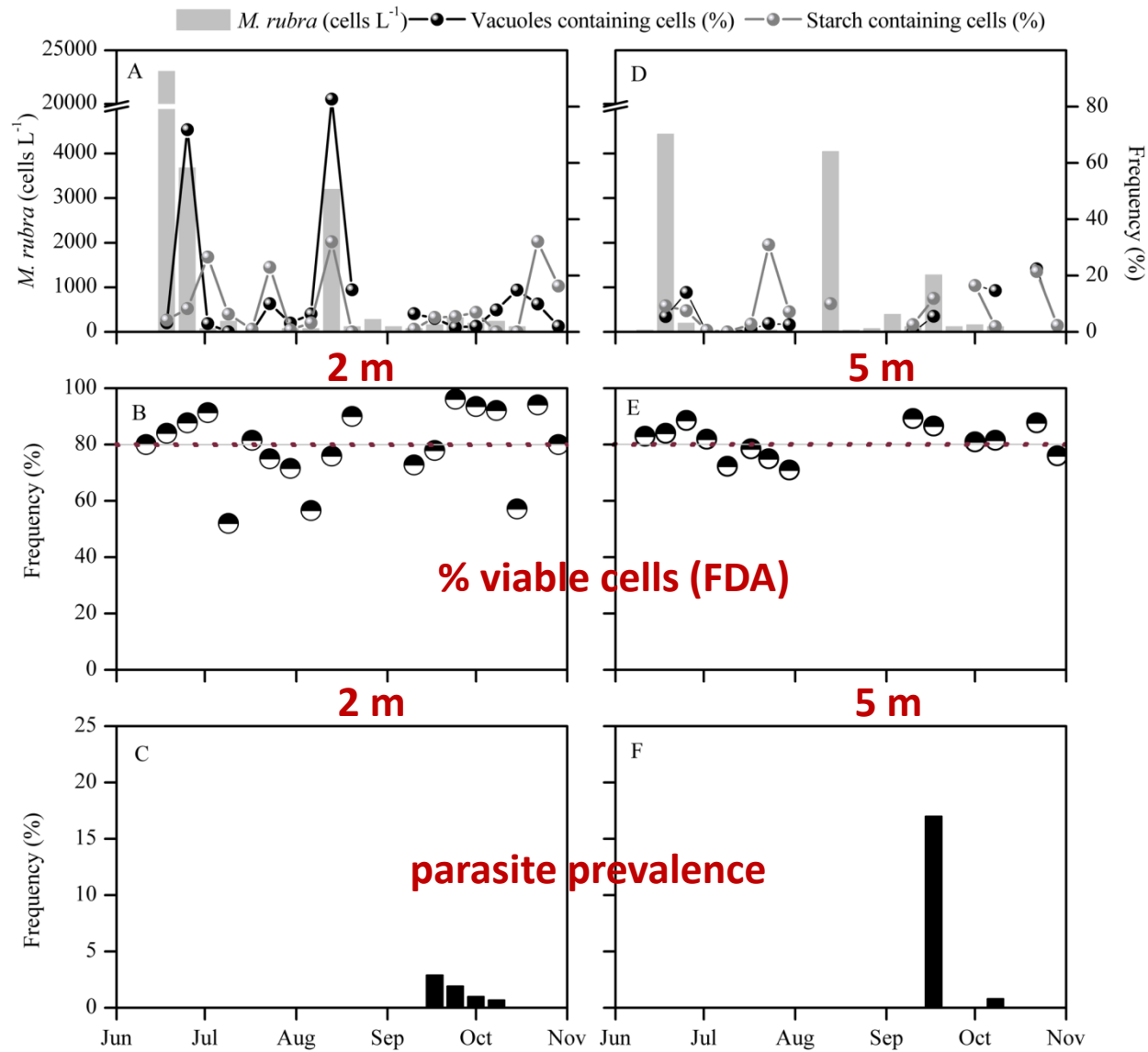
L. Velo-Suárez^{a, b},  , S. González-Gil^c, Y. Pazos^d, B. Reguera^a



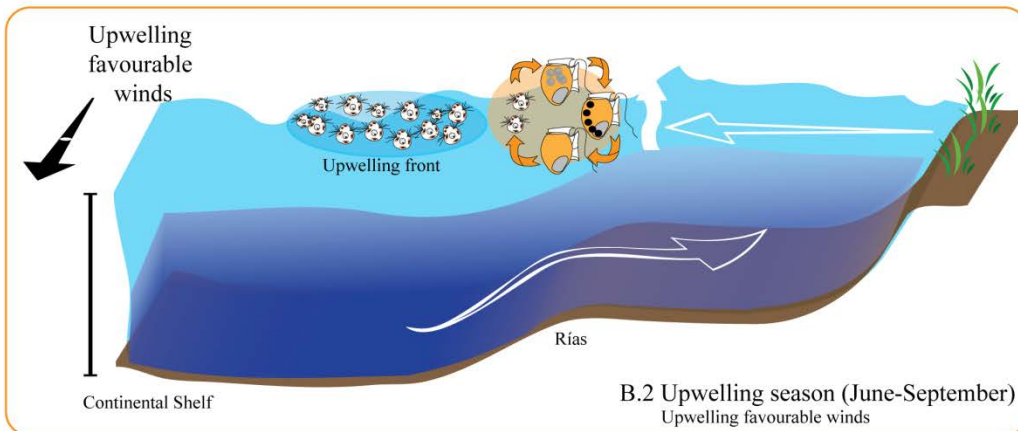
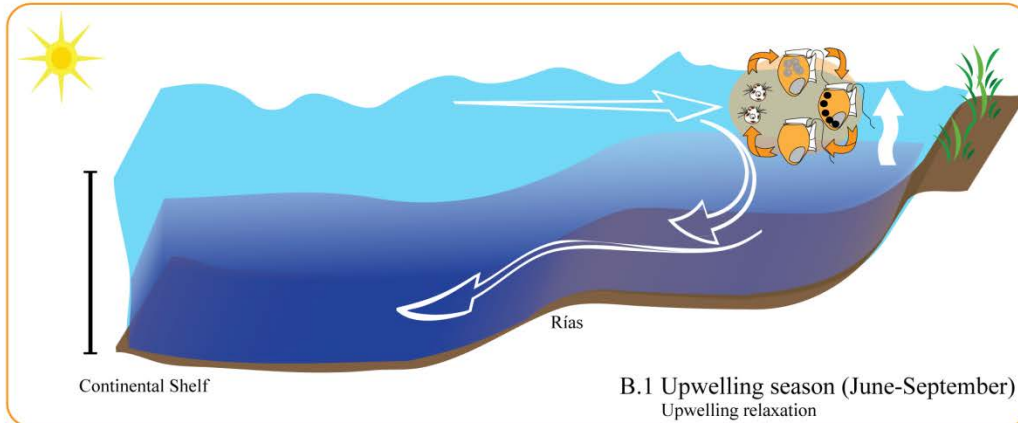
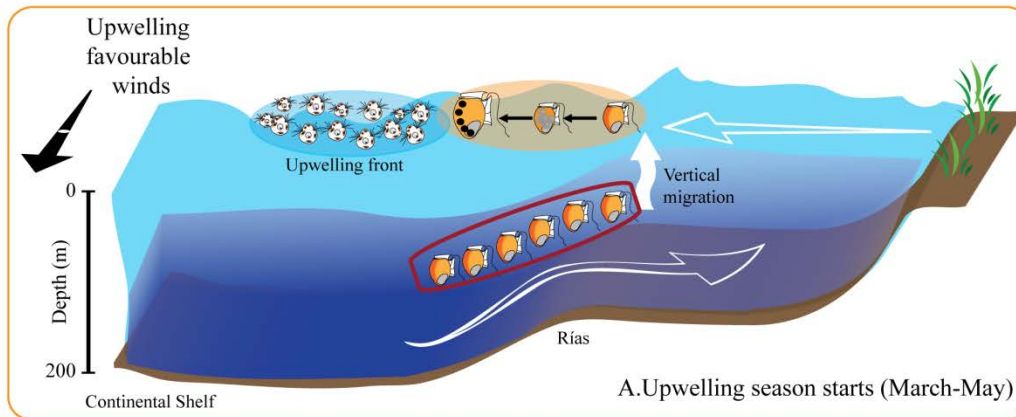
Anomalías de la temperatura superficial del mar, SST (media mensual) respecto a la media de los últimos 30 años, observadas en el Atlántico norte de enero a abril de 2012 (Díaz et al., 2013).



A) Daily upwelling indices; B) Vertical distribution of temperature at station P2 ; Weekly distribution of *D. acuminata* C) hose samples (0-5, 5-10, 10-15, 15-20 m) and 2 m bottle; D) integrated (0–20 m) hose samples, and 5 m depth bottle. Ría de Pontevedra 2007.



Interacciones biológicas en población de *D. acuminata*. Hot spot en Ría de Pontevedra



**Velo-Suárez et al.
Deep Sea Res. II 2013**

Mar. Drugs 2013, 11, 2964–2981; doi:10.3390/md11082964

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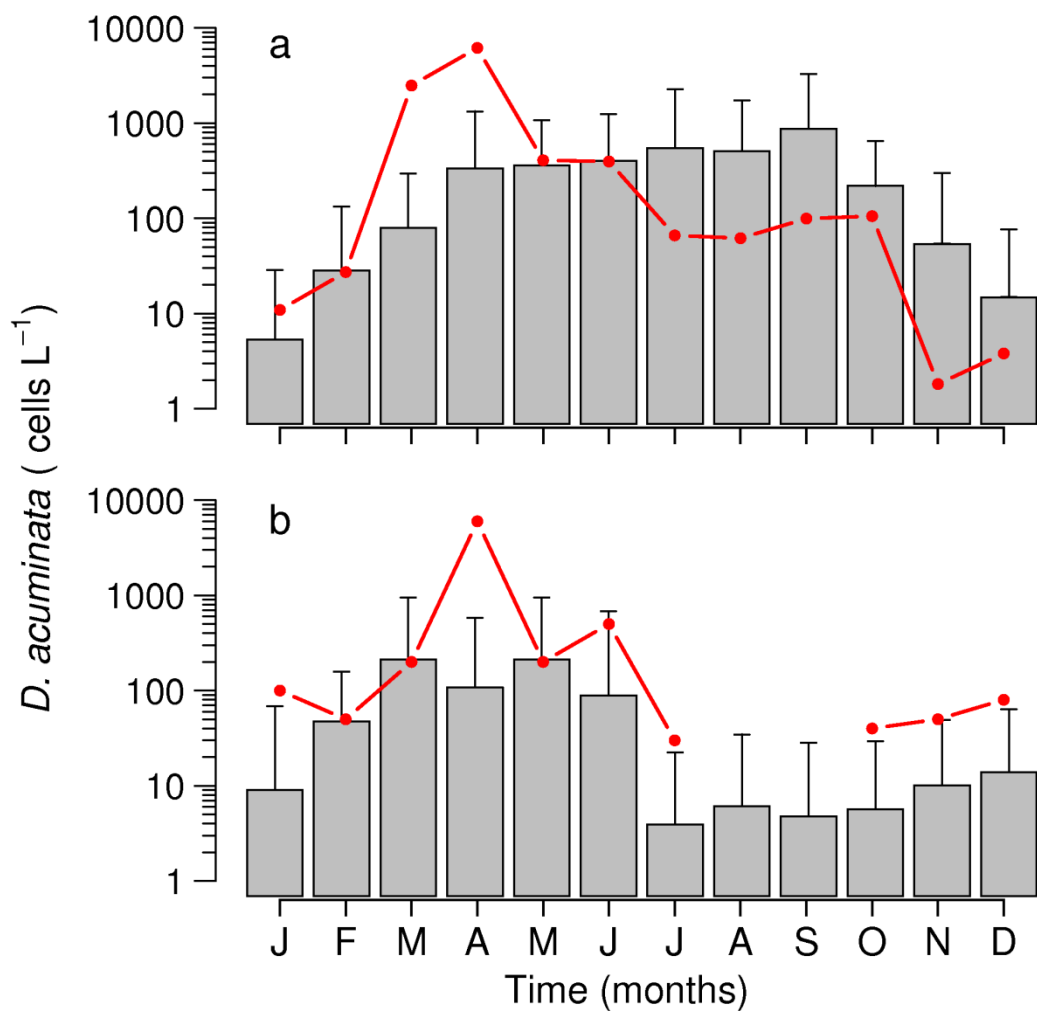
ISSN 1660-3397

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Article

Climate Variability and Oceanographic Settings Associated with Interannual Variability in the Initiation of *Dinophysis acuminata* Blooms

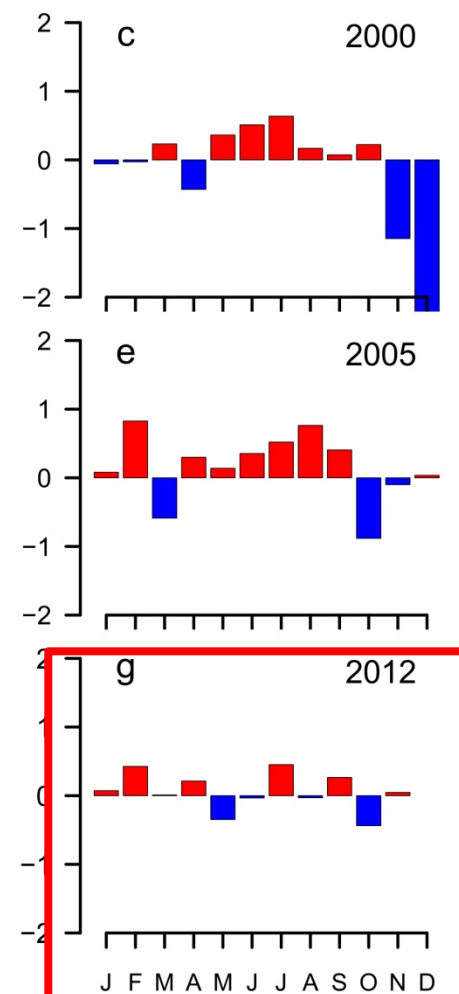
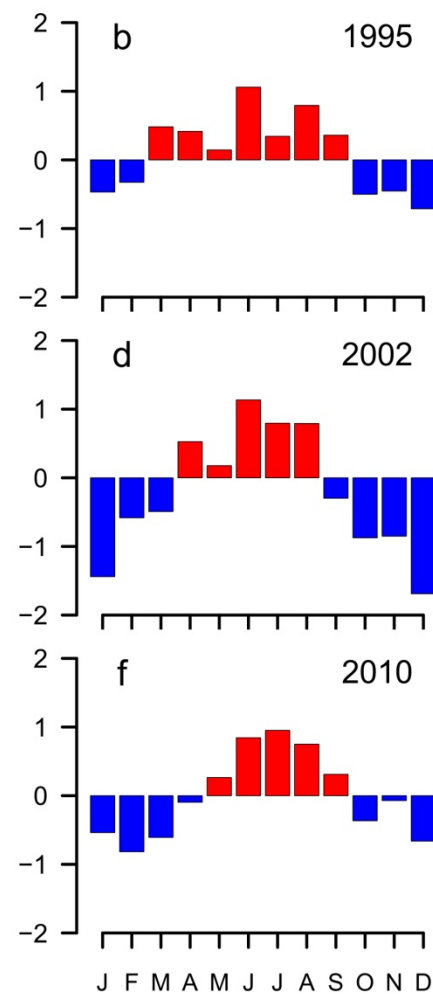
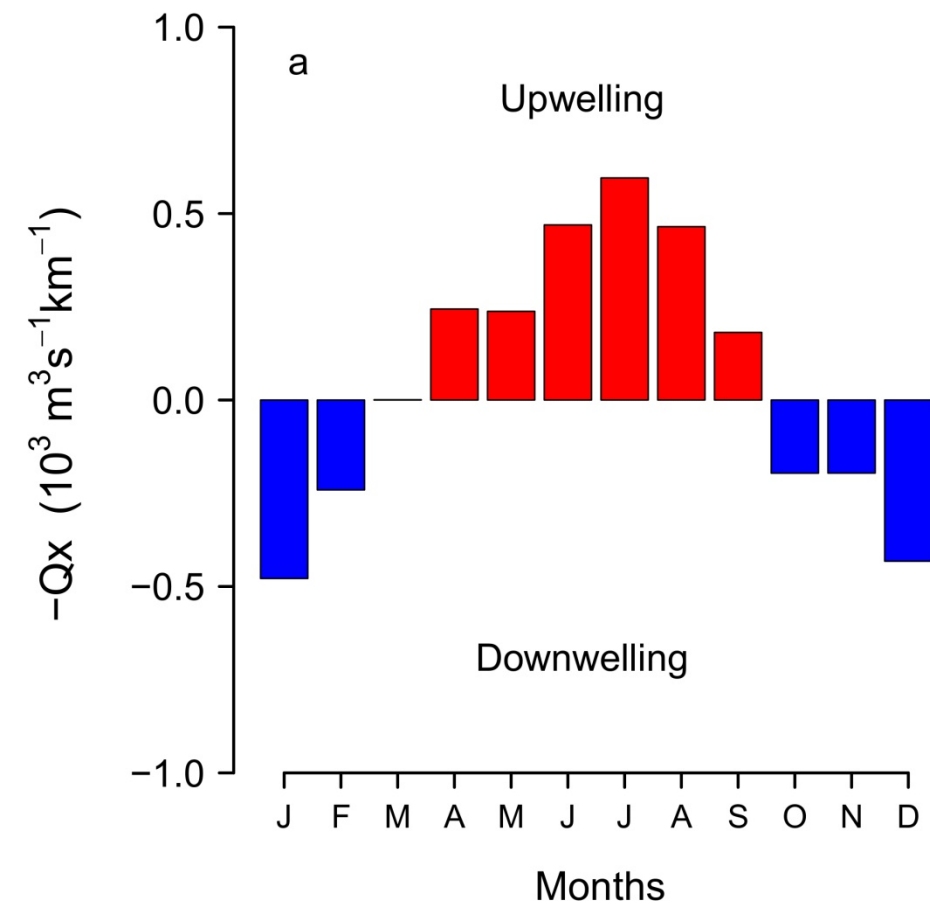
Patricio A. Díaz ^{1,*,}, Beatriz Reguera ¹, Manuel Ruiz-Villarreal ², Yolanda Pazos ³, Lourdes Velo-Suárez ⁴, Henrick Berger ⁴ and Marc Sourisseau ⁴

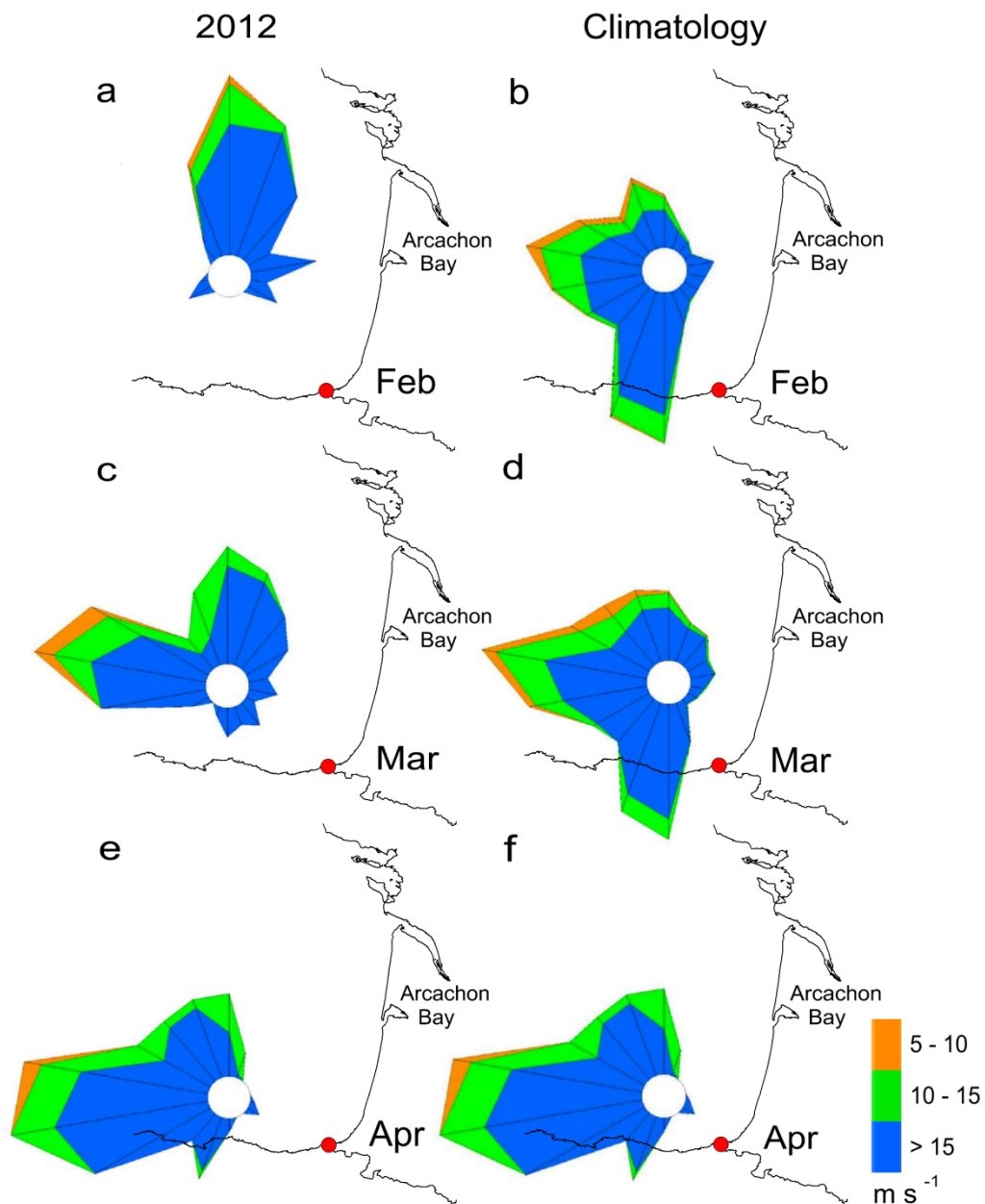


**Ría de Pontevedra
Rías Gallegas**

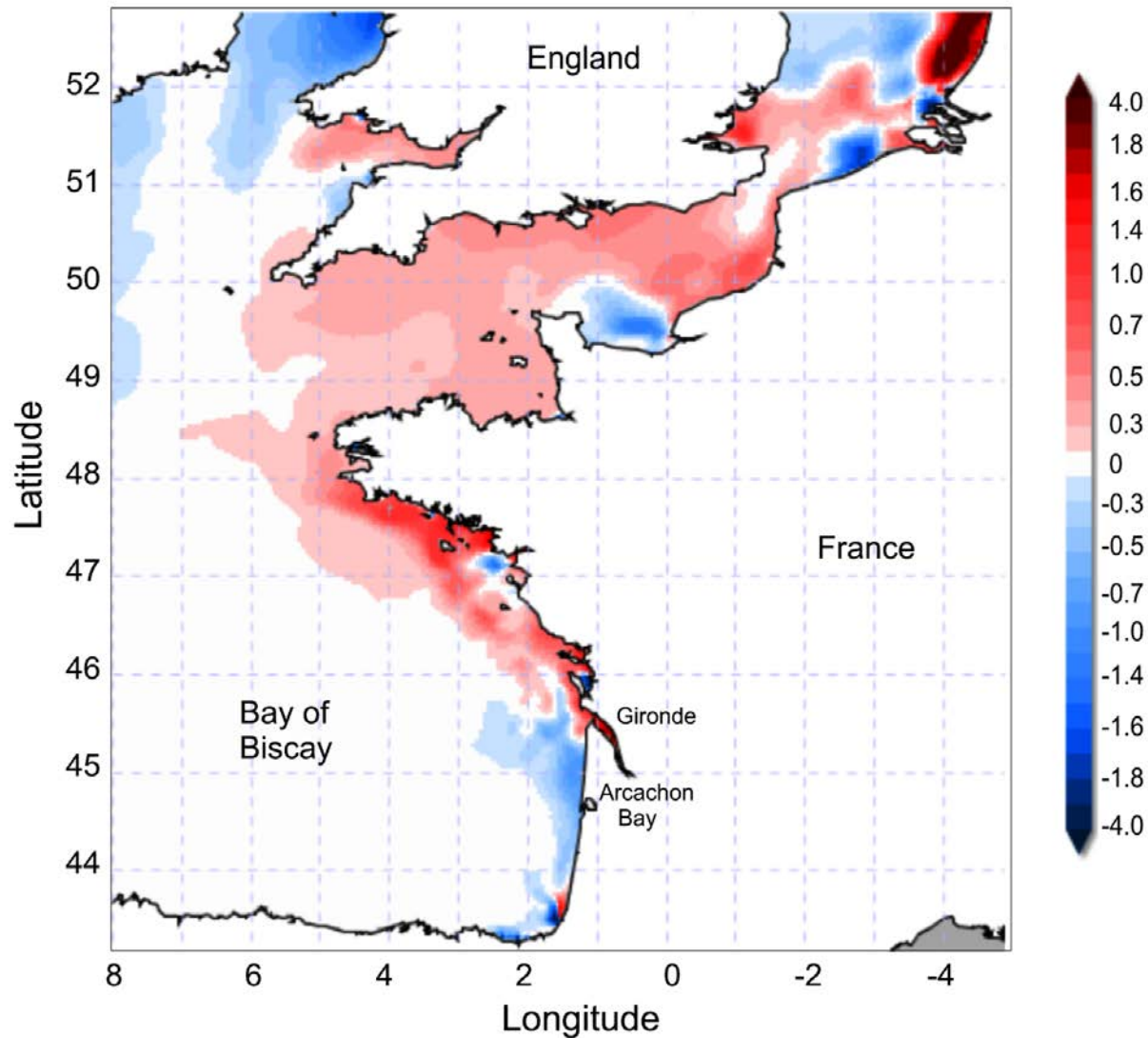
**Bahía de Arcachon
SE Golfo Vizcaya**

Concentraciones record (+ 7.4 SD en Galicia; 100 x media en Arcachon) en la serie de 28 años en Galicia y > 20 en Arcachon.





**Anomalías del patrón de
circulación de vientos en
invierno de 2012 en el
sudeste del Golfo de
Vizcaya (IFREMER Brest)**



Anomalías de salinidad en superficie. Simulación para febrero de 2012 del modelo operacional MARS-3D del IFREMER para el Golfo de Vizcaya (Díaz et al. 2013).



Con la financiación de proyectos:

ASIMUTH

Applied Simulations and Integrated Modelling for the Understanding of Toxic and Harmful Algae Blooms

UE, 7FP Space, Grant Agreement 261860

DIGEDINO

Aplicación de técnicas moleculares al estudio de poblaciones y cultivos de dinoflagelados del género *Dinophysis* (CTM2009-12988-C02-01)